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PATENT COOPERATION TREATY

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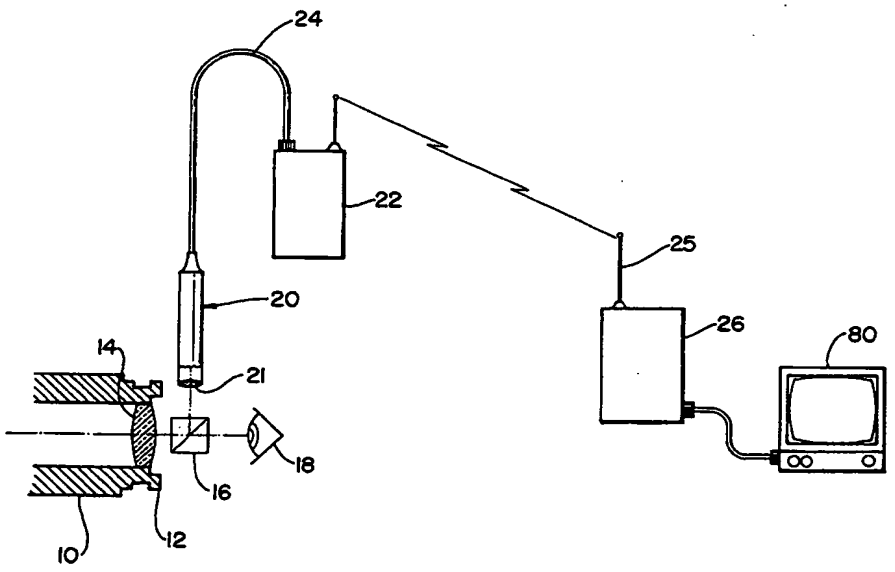

(57) Abstract

A real-time, multiple path video imaging system, comprising: a plurality of independent optical viewing devices, each of the devices having at least one optical viewing path; a beam splitter (16) removably attached to each of the viewing devices, each beam splitter having a first split beam path for enabling optical viewing and a second split beam path; an electronic video imaging device (20) removably attached to each of the viewing devices, each in alignment with one of the second split beam paths, a video processor for each of the imaging devices, creating a real-time video signal representing images in the optical viewing path; and a transmitter (22) for each of the video processors for wireless transmission of each video signal to a remote receiving station. The transmitted signals are distinguishable from one another, for example, by data in an on screen display and/or by respective transmission carrier frequencies.

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REAL TIME, MULTIPLE PATH VIDEO IMAGING SYSTEM

Background of the Invention

1. Field of the Invention

The invention relates to the field of real time video imaging systems using optical viewing devices, and in particular, to real time video imaging systems having multiple optical paths and associated video imaging systems, which can be used with conventional, unmodified optical viewing devices.

2. Description of Related Art

There is a continuing need for surveillance devices which allow a forward observer to provide live video imaging to a remote location. Conventional video cameras are available to create a video recording of a scene. Significantly, however, such cameras are often unsuitable for specialized situations such as military combat and news gathering activities. It is inconvenient and impractical to operate a conventional video camera under circumstances where the user may be engaged in intense combat or other activities which command the users concentration. Particularly in the case of military combat, it may be of great importance for a remote commander of troops or vehicles to be able to observe precisely the same scene which is being observed by an infantry soldier, artillery observer, anti-aircraft gunner, or submarine commander. Conventional video cameras often provide unsatisfactory performance in such circumstances because they fail to take advantage of the view enhancing devices to which an individual in the field may have access such as view magnifiers, night vision equipment, or wide field of power sights. It would be desirable to provide an imaging system which provides real time camera viewing through day or night viewing devices, which is easily adaptable for use with existing equipment. It would be further desirable to provide such an imaging system which allows forward observers to take advantage of such conventional day or night viewing devices in transmitting live video to a rear echelon.

Endoscopes having multiple optical paths and utilizing video cameras are disclosed in: US 4,963,906; US 4,839,723; US 4,594,608; and, US 4,439,030. Microscopes having multiple

optical paths and utilizing video cameras are disclosed in US 5,497,267; US 5,481,401; US 5,235,459, US 5,144,478; US 5,006,872; and, US 4,786,154.

A high resolution, super-micro CCD color camera is available from Toshiba Video Communication and Information Systems, Buffalo Grove, Illinois. Model IK-SM40A has a 1/4 ", 410,00-pixel CCD with microlens technology, requiring a minimum illumination of 15 lux at F1.6. The focus range is from 10 mm to infinity.

A number of wireless video communication devices are available from Premier Wireless, Inc., Livermore, California. Models CS-220 and CS-120 will process and transmit full color video and audio up in a range of several miles, and over any one of four user selectable channels. A number of multi-channel wireless communication devices for processing and transmitting full color video and audio are also available from TRON-Tek, Inc., Tulsa, Oklahoma, including models in the 1800 Series of video Equipment, operating in the 1710-1850 MHz range and the 2400 Series of video Equipment operating in the 2450-2483.5 MHz range. The 2400 Series includes, inter alia, models TT-245TAFS and TT-24RAFS. The 1800 Series includes, inter alia, models TT185TAFS and TT-18RAFS.

Stabilized hand-held binoculars are available from Fraser-Volpe Corporation, Warminster, Pennsylvania, as model STEDI-EYE® M-25.

None of the optical instruments in the patents listed above is part of a multiple source system wherein video information from human observers making simultaneous observations in various locations is simultaneously transmitted by a wireless communication carrier to a central location at which all of the real time video signals can be monitored simultaneously with the human observers.

Summary of the Invention

The problems of the prior art are solved by a real time, multiple path video imaging system in accordance with the inventive arrangements taught herein.

A real time, multiple path imaging system, in accordance with an inventive arrangement, comprises: a plurality of

independent optical viewing devices, each of the optical devices having at least one optical viewing path; an eyepiece terminating each of the optical viewing paths; a beam splitter removably attached to each of the optical viewing devices, each beam splitter having a first split beam path continuing the optical path and enabling optical viewing and a second split beam path; an electronic video imaging device removably attached to each of the viewing devices, in alignment with respective ones of the second split beam paths; a video processor coupled to each of the video imaging devices for creating a real time video signal representing images in the optical viewing path; and, a transmitter coupled to each of the video processors for wireless transmission of the respective video signal to a remote receiving station, the transmitted video signals being distinguishable from one another.

The respective beam splitters and the respective video imaging devices can be formed as part of an integral unit, the integral unit having means for removable attachment to the respective eyepiece.

In one embodiment, the video signals are distinguishable from one another at least by data in an on screen display added to the respective video signals by the respective video. In a second embodiment, the video signals are distinguishable from one another at least by respective transmission carrier frequencies. The data can identify the respective video processors and/or the data can information from a global positioning sensor.

At least one of the optical viewing devices can comprise a monocular, or a binocular, or a periscope or multiple mirrors.

The respective video processors and the transmitters can be formed as part of an integral unit, the integral units being connected to the respective imaging devices by respective flexible couplings.

In accordance with a presently preferred embodiment, the imaging system comprises a mounting structure for attaching the imaging system on a viewing portion of a viewing device.

A beam splitter is mounted on the mounting structure for transmitting in a first optical direction, an image observable through the viewing portion of the viewing device, and simultaneously transmitting the same image in a second optical direction to an electronic image sensing device. The electronic image sensing device is preferably a miniature video camera capable of converting the image into an electronic signal such as a standard video signal. The video signal may thereafter be communicated to a miniature transmitter for transmission of the signal to a remote location or the signal may be recorded.

The imaging device permits real time camera viewing through conventional viewing equipment such as binoculars, monoculars, periscopes, gunsights or other day/night viewing devices such as the 14X power M-25 day/night stabilized binoculars. An operator of the imaging system can use conventional viewing equipment in a normal manner and without internal modification of the basic optical or electronic system. The device is preferably designed to be interposed between an eyepiece of a conventional viewing device displaying an image to be viewed, and the observer's eye(s). The scene being viewed by the observer in the field can be transmitted to a remote receiver through a miniature camera.

A significant advantage of the system is that the mounting structure can be easily removed from conventional viewing equipment when not in use, and the basic viewing system will thereafter be restored to its original configuration.

Brief Description of the Drawings

There are shown in the drawings embodiments which are presently preferred, it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

Figure 1 is a block diagram of a camera control unit in accordance with an inventive arrangement.

Figure 2 is a pictorial illustration of a real time, multiple path video imaging system in accordance with an inventive arrangement.

Figure 3 is a pictorial illustration of a real time, multiple path video imaging system in accordance with another inventive arrangement.

Figure 4 is a diagrammatic view of one channel of a real time, multiple path video imaging system in accordance with the inventive arrangements shown in Figures 2.

Figure 5 is an exploded view illustrating attachment of a video camera to an eyepiece, in accordance with an inventive arrangement.

Figure 6 is a perspective view of Figure 5.

Figure 7 is a rear view of incorporating structure shown in Figure 6.

Figure 8 is a side view of an alternative embodiment of the real time, multiple path video imaging system in accordance with another inventive arrangement.

Figure 9 is a pictorial illustration of a real time, multiple path video imaging system in accordance with yet another inventive arrangement.

Detailed Description of the Preferred Embodiments

A real time, multiple path video imaging system in accordance with an inventive arrangement is shown in Figures 1 and 2 and generally designated in Figure 2 by reference numeral 100. The real time, multiple path video imaging system 100 shown in Figure 2 is embodied as the technological foundation for a military style surveillance team. Three of four military observers 101, 111 and 121 are shown in detail. A fourth observer is represented by phantom block 131. Each of the observers is provided with an optical viewing device, for example a pair of binoculars designated 102, 112 and 122.

Observer 101 has a tank 105 under surveillance along a line of sight 106. Observer 111 has a half-track truck 115 under surveillance along line of sight 116. Observer 121 has a helicopter 125 under surveillance, along a line of sight 126. As will be explained more fully in connection with Figures 1 and 4, each optical viewing device is provided with a video camera which supplies a video signal to a camera control unit by means of a video cable. Observer 101 has a camera control unit 103 which receives signals from video

cable 104. Observer 111 has a camera control unit 113 which receives video signals from cable 114. Observer 122 has a camera control unit 123 which receives video signals from cable 124.

Each camera control unit encodes the received video signal, and transmits the video signal through a wireless communication link to a central receiving station. Camera control unit 103 establishes a wireless communication link 107. Camera control unit 113 establishes a wireless communication link 117. Camera control unit 123 establishes a wireless communication link 127. The observer represented by block 131 establishes a communications link 137.

The video signals transmitted on the respective communication links are received by an antenna 25 of a receiver and decoder 26. Receiver and decoder 26 supplies a base band video signal, for example, to a video monitor 80. In this illustrated embodiment, the receiver and decoder 26 or the monitor 80 are provided with a channel selector for selectively observing the subject matter under surveillance by any one of the four observers.

A schematic diagram of an imaging system is shown in Figure 4. The imaging system is representative of such structure in each of the embodiments illustrated herein. A conventional viewing system, in this case a monocular body 10, is shown to illustrate the use of the invention. Monocular body 10 includes an eyepiece 12 and an eye lens 14 mounted therein. Monocular body 10 can be one half of a pair of binoculars, a periscope or other kind of optical viewing device.

An optical beam splitter 16 is interposed between the eye lens 14 and an observer's eye 18. When the monocular is in use, an image is transmitted through the eye lens 14, in the direction of the observer's eye 18. With the beam splitter 16 interposed between the eye lens 14 and the observer's eye 18, the transmitted image is partially diverted so that the image is directed in two directions. More particularly, the image is partially transmitted through the beam splitter 16, for observation by a user, and partially reflected by the beam

splitter so that it is incident on an electronic imaging device 20. The electronic imaging device converts the incident optical image from the beam splitter to an electronic image signal. In one embodiment, the electronic imaging device 20 is electronically connected to a transmitter 22 by means of a video cable 24. The transmitter 22 communicates with receiver 26 which is preferably at a remote location. A video monitor 80 is preferably provided at the remote location in order to permit viewing of the received electronic image signal.

In a more specific aspect, the beam splitter 16 is preferably an optical beam splitter. Such optical beam splitters can be provided in the form of prisms, which are well known in the optical field. Alternatively, any other suitable optical means may be used to perform the beam splitting function, provided that an image transmitted through the eye lens 14 is remains observable by the observer and a separate signal is transmitted to the imaging device 20.

The imaging device 20 may be comprised of any suitable electronic means for converting an incident optical image received from the beam splitter into an electronic image signal. One example of such a device would be a 1/4" super-micro color CCD camera with a 4mm, f2.5 lens, for example Model IK-SM40A from Toshiba Video Communication and Information Systems. The electronic image signal is preferably a conventional video signal, but the invention is not limited in this regard. The imaging device is preferably comprised of a CCD or charge coupled device and associated electronic processing circuitry to provide solid state imaging. Such imaging devices are well known to those of ordinary skill in the art. A focusing lens 21 may be provided between the CCD imager and the beam splitter, but is not required.

In a more specific aspect, the transmitter 22 converts an electronic image signal into an RF signal for transmission to a receiver. While an RF link is preferred in this regard, it should be noted that a cable link may also be used between the transmitter and receiver. In a preferred embodiment,

transmitter 22 may also contain a camera control unit. The camera control unit provides the scan, sync frequency, AGC and video processing for the CCD image sensor. The above descriptions relate to standard electronics provided with miniature camera and transmitter equipment.

A camera control unit is shown in block diagram form in Figure 1. The camera control unit is responsive to a composite video signal supplied by camera 20. The camera control unit comprises an encoder 22, a key pad 229 and a transmitter 240. The encoder 22 comprises a sync separator 220, a line selector 221, a line clock 222 and a dot clock 223. The dot clock 223 provides a clock signal for a read/write memory 225 and a read only memory character generator 226. The line clock 222 supplies a second clock signal to the read only memory character generator 226. Key pad 229 can be used to enter an identification code which distinguishes the source of the video signal ultimately transmitted to the central location from the other transmitted video signals. A key pad decoder 224 provides an input to the read/write memory 225, responsive to the key pad 229. The characters generated in response to the key pad 229 are stored in a shift register 227, and supplied to a video adder 228. The composite video signal is also an input to video adder 228, the output of which includes the source identifying information as an on-screen display. The video signal with the source identifying information is an input to transmitter 240, which establishes the wireless communication link with the central location.

Another embodiment of the invention is shown in Figure 3 and generally designated by reference numeral 300. In Figure 3, the real time, multiple path video imaging system is utilized by a tank squadron. An observer 301 in tank 302 transmits a video signal from antenna 303 on a wireless communication link 304. An observer 311 in tank 312 transmits a video signal from antenna 313 on a wireless communication link 314. An observer 321 in tank 322 transmits a video signal from antenna 323 on a wireless communication link 324. A fourth observer in a tank is represented by block 331 and

wireless communications link 334.

A receiver and encoder 26 has an antenna 25. In a first alternative, a video cable 27 supplies video signals to each of video monitors 81, 82, 83 and 84. Each of these monitors can be tuned to one of the respective channels corresponding to the wireless communication links, so that the situations under surveillance by each of the observers can be monitored simultaneously. In another alternative, a video cable 29 represented in phantom supplies a signal to a monitor 85 which can display each of the pictures simultaneously, in respective quadrants.

Yet another embodiment of the real time, multiple path video imaging system is illustrated in Figure 9. The imaging system in Figure 9 is generally designated by reference numeral 400, and includes a satellite link. Although only one observation position is illustrated in Figure 9, the system comprises multiple observer positions, as shown in each of Figures 2 and 3. In Figure 9, a pair of stabilized binoculars 402 enables surveillance of a tank 405 along a line of sight 406. The binoculars 402 can be stabilized hand-held binoculars available from Fraser-Volpe Corporation as Model STEDI-EYE® M-25. An attachment arrangement 408 for a video camera (not shown in detail), is mounted on one of the eyepieces of the binoculars 402. A video cable 404 supplies a video signal to an encoder and transmitter 403. Transmitter 403 establishes a wireless communication link with a satellite station 410, which itself establishes a further wireless communication link with a central headquarters location 416 through a satellite 412. A monitor 418 in the central headquarters 416 can display an image 405' of the tank under surveillance by the binoculars 402. The video signal can be recorded by video recorder 420. It will be appreciated that the real time, multiple path imaging system in accordance with the inventive arrangement shown herein can provide real time video from surveillance teams almost anywhere in the world to a central headquarters almost anywhere else in the world.

A mounting arrangement for a beam splitter and video camera is illustrated in Figures 5 and 6. An eyepiece 28 of a

binocular, for example a STEDI-EYE® M-25 stabilized binocular, has an annular groove 29, which is typical of most eyepieces. In some cases, the body of the eyepiece is not grooved, but a projecting rim defines a part of an annular groove. A mounting ring 30 has a substantially L-shaped cross-section, defining an annular base portion and an annular wall portion. A portion 31 of the annular wall portion is cut away or notched to receive the barrel of camera 20. The beam splitter 16 and camera 20 are mounted in a circular member 35 which also has at least one annular groove. Member 35 is positioned inside of ring 30, against the base portion, with the camera 20 disposed in the cutaway portion 31. Member 35 is held in the ring 30 by a plurality of set screws 33. Ring 30 can be provided with different inside diameter openings, so as to accommodate attachment to different eyepieces. The inner diameter of the wall portion of ring 30 can be uniform, so that one size of member 35 will fit all adapters and all eyepieces. The ring 30, with attached member 35, is held in place by thumbscrews 32.

The camera 20 is mounted in a barrel 39 affixed to the ring 30, and held in place by a set screw 38. Barrel 39 has a radially outwardly directed threaded end. Strain relief for the cable 24 is provided by an end cap 36 and a slotted grommet 37. End cap 36 has a radially inwardly directed threaded end. An eyeshield 44, which is normally mounted in the groove on the eyepiece, is removed from the eyepiece, and can be reattached to a groove on member 35.

The installation process can be as follows. The set screw for the camera is very lightly tightened. Member 35, with camera 20 and beam splitter 16, is affixed to the proper size ring 30 with the set screws. The video camera system is then turned on, and a distant object or scene, preferably 1500 meters or more away, is used to focus the camera lens for the sharpest picture (an infinity focus). The eye cup or eye shield is then removed from the eyepiece, and the ring 30 is slipped over the eyepiece and lightly secured by the thumbscrews. The camera is then inserted into the camera tube and secured by a set screw. While observing the video image

on a video monitor, the camera is rotated until the picture is right side up and reasonably straight. The set screw is then further gently tightened, just enough to hold the camera in place. The thumbscrews are loosened just enough to allow the diopter ring to be turned, and the diopter ring is turned until the reticle image, as viewed on the video monitor, is in sharpest focus. The ring is rotated slightly, as necessary, to insure that the video image is plumb. When the image is in a satisfactory orientation, the thumbscrews are tightened. To complete the installation, the split grommet is slipped onto the cable protruding from the end of the camera unit, approximately one inch from the camera back. The relief end cap is slipped over the cable, engaging the grommet with the notch on the end of the cap. The end cap and grommet are slid along the cable, over the protruding end of the camera to engage the threads on the end of the camera tube and the end cap is screwed onto the camera tube until tight.

When the imaging device according to the invention is not in use, it may easily be removed from the associated viewing equipment. The invention is particularly advantageous for use in conjunction with conventional viewing devices such as binoculars, monoculars, spotting telescopes, panoramic telescopes, direct fire gunsights and periscopes. Likewise, the invention may also be used with corresponding night vision versions of such viewing devices.

Figure 8 illustrates the present invention in use in connection with another type of conventional viewing device, in this case a wide field of view, unity power sight 50. As shown in Figure 8, the beam splitter 16 is mounted on a window or viewing screen 51. Window 51 is maintained in position by means of a frame 52, which also supports an imaging device 53. Optical beam splitter 16 is preferably adhered to window 51 by means of a U.V. lens bond 54. As with the previously described embodiment, the beam splitter is interposed between the image to be observed and an observer's eye 18. When the sight 50 is in use, an image incident on window 51 will be partially transmitted toward the users eye 18 and partially reflected toward imaging device 53. Imaging device 53

includes an objective lens 55, a photo-detector such as a CCD and associated video processing circuitry.

As illustrated by Figure 8, the invention is suitable for use with any heads up display (HUD) type sight or other sights which use a large exit pupil for two eyed viewing. This would include MGI VADS sights, armored driving periscopes, and binocular commanders sights.

In each of the embodiments disclosed herein, the wireless communication links or paths can be implemented by the wireless communication devices from Premier Wireless, Inc., for example, Models CS-220 and CS-120, and devices from TRON-Tek, Inc., for example, the 1800 and 2400 Series.

The invention as disclosed herein has been shown in several specific embodiments. Significantly, however, the invention is not limited in this regard. The imaging system can be used in conjunction with any conventional viewing system to provide video information to a remote location without interrupting on-site surveillance by an observer or team of observers.

What is claimed is:

1. A real time, multiple path imaging system, comprising:

a plurality of independent optical viewing devices, each of said optical devices having at least one optical viewing path;

a beam splitter removably attached to each of said optical viewing devices, each beam splitter having a first split beam path continuing said at least one optical viewing path and enabling optical viewing and a second split beam path;

an electronic video imaging device removably attached to each of said viewing devices, in alignment with respective ones of said second split beam paths;

a video processor coupled to each of said video imaging devices for creating a real time video signal representing images in said optical viewing path;

a transmitter coupled to each of said video processors for wireless transmission of said respective video signal to a remote receiving station, said transmitted video signals being distinguishable from one another.

2. The imaging system of claim 1, further comprising an eyepiece terminating at least one of said at least one optical viewing paths, said beam splitter being aligned with said eyepiece.

3. The imaging system of claim 2, wherein said respective beam splitters and said respective video imaging devices are formed as part of an integral unit, said integral unit having means for removable attachment to said respective at least one eyepiece.

4. The imaging system of claim 1, wherein said video signals are distinguishable from one another by data in an on screen display added to said respective video signals by said respective video processors.

5. The imaging system of claim 1, wherein said video signals are distinguishable from one another by respective transmission carrier frequencies.

6. The imaging system of claim 4, wherein said data

identifies said respective video processors.

7. The imaging system of claim 4, wherein said data represents information from a global positioning sensor.

8. The real time imaging system of claim 1, wherein at least one of said optical viewing devices comprises a monocular.

9. The imaging system of claim 1, wherein at least one of said optical viewing devices comprises a binocular.

10. The imaging system of claim 1, wherein at least one of said optical viewing devices comprises a periscope.

11. The imaging system of claim 1, wherein at least one of said optical viewing devices comprises multiple mirrors.

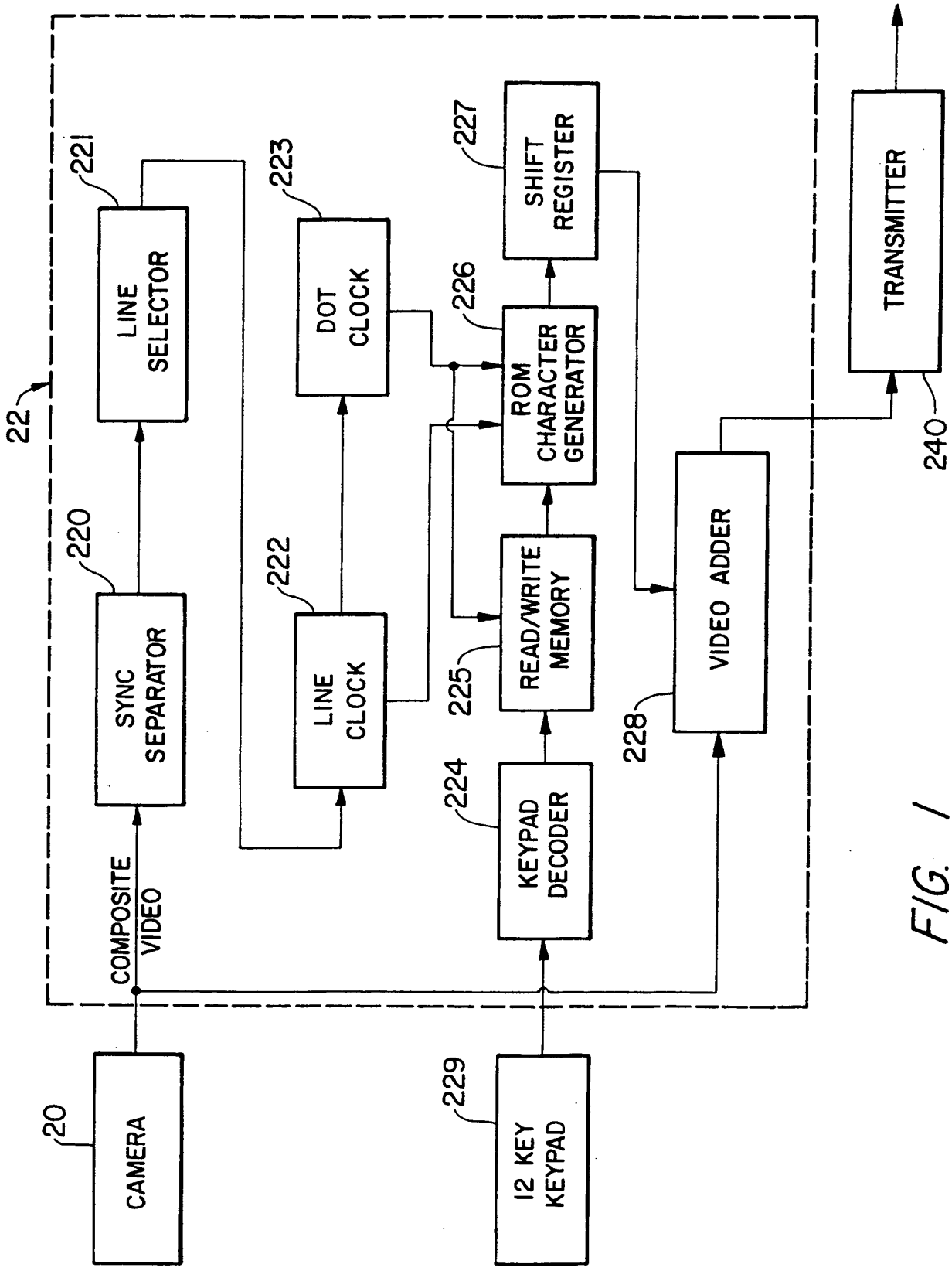
12. The imaging system of claim 1, wherein said respective video processors and said transmitters are formed as part of an integral unit, said integral units being connected to said respective imaging devices by respective flexible couplings.

13. The imaging system of claim 1, further comprising a viewing screen terminating at least one of said at least one optical viewing paths, said viewing screen having a viewing surface on which said beam splitter is substantially centrally disposed.

14. The imaging system of claim 13, wherein said beam splitter is adhesively bonded to said viewing surface.

15. The imaging system of claim 13, wherein said electronic imaging device is disposed at a perimeter position of said viewing screen, said electronic imaging device comprising an objective lens for focusing images from said beam splitter propagated along said second split beam path.

16. The imaging system of claim 1, wherein said wireless transmission comprises a satellite link.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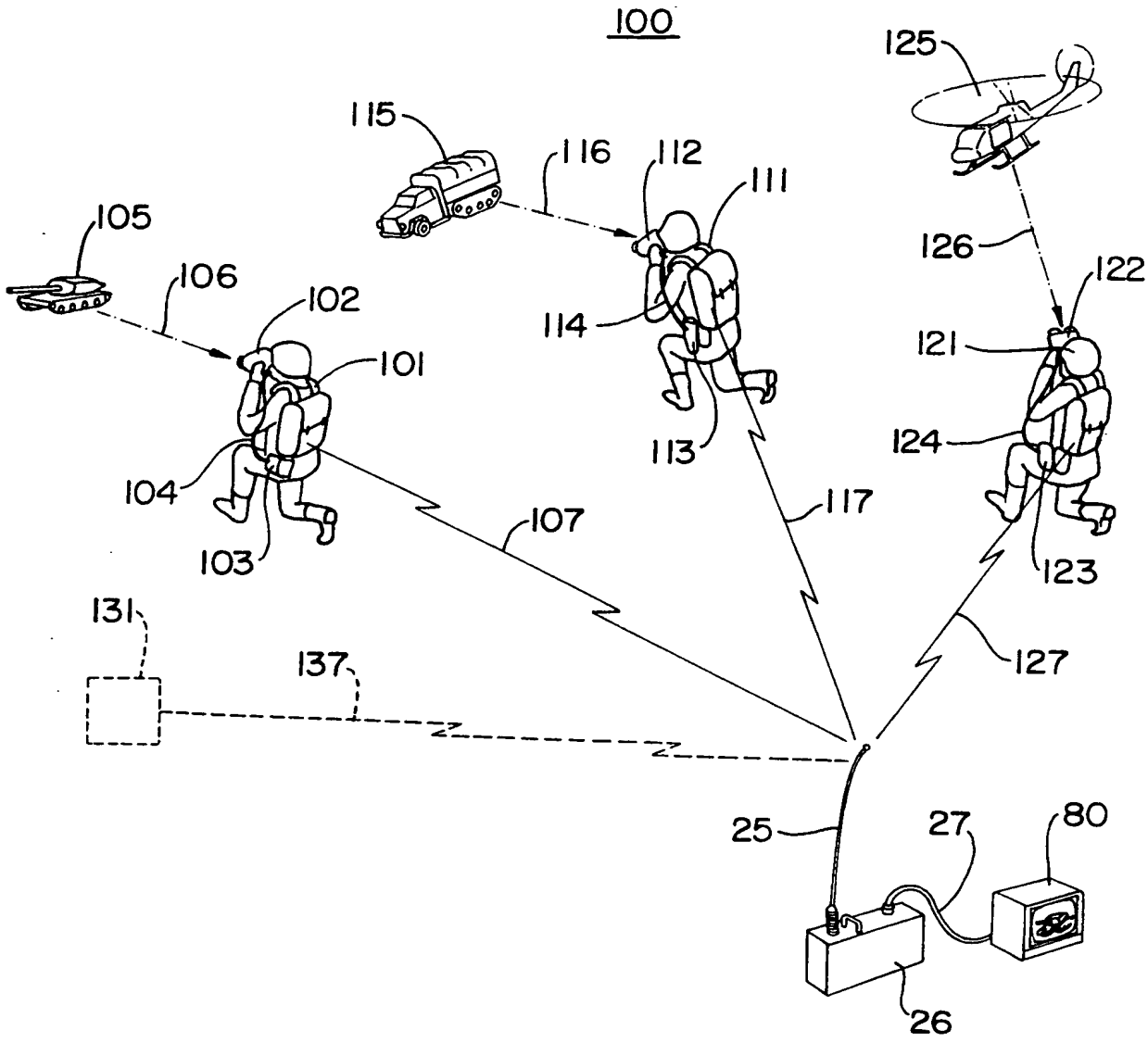
225
READ/WRITE MEMORY
226
ROM CHARACTER GENERATOR
227
SHIFT REGISTER
228
VIDEO ADDER
229
12 KEY KEYPAD
240
TRANSMITTER

FIG. 1


100
125
115
116
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111
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126
106
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107
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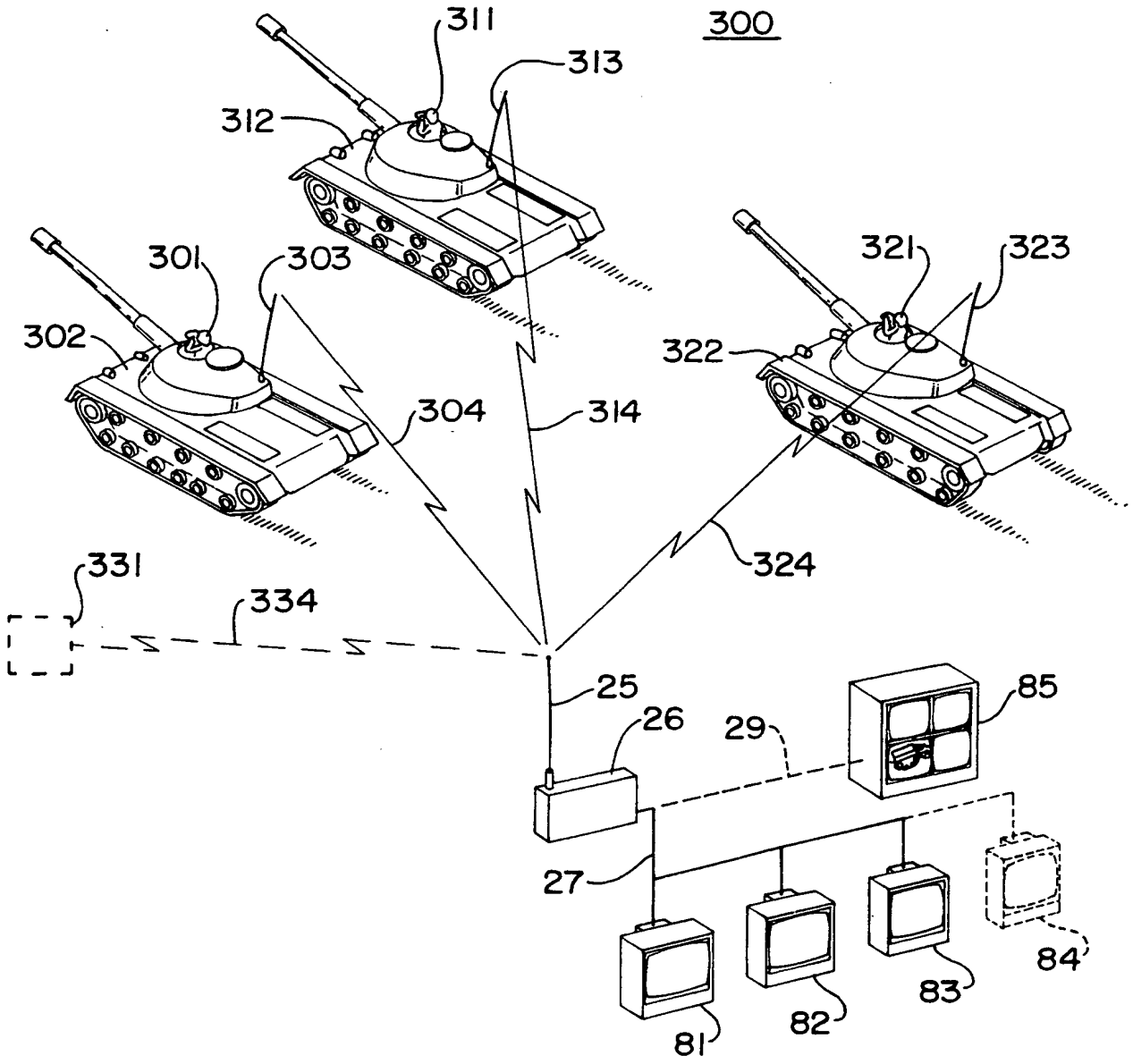
80
26

FIG. 2


311
300
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312
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322
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314
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324
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84
83
82
81

FIG. 3

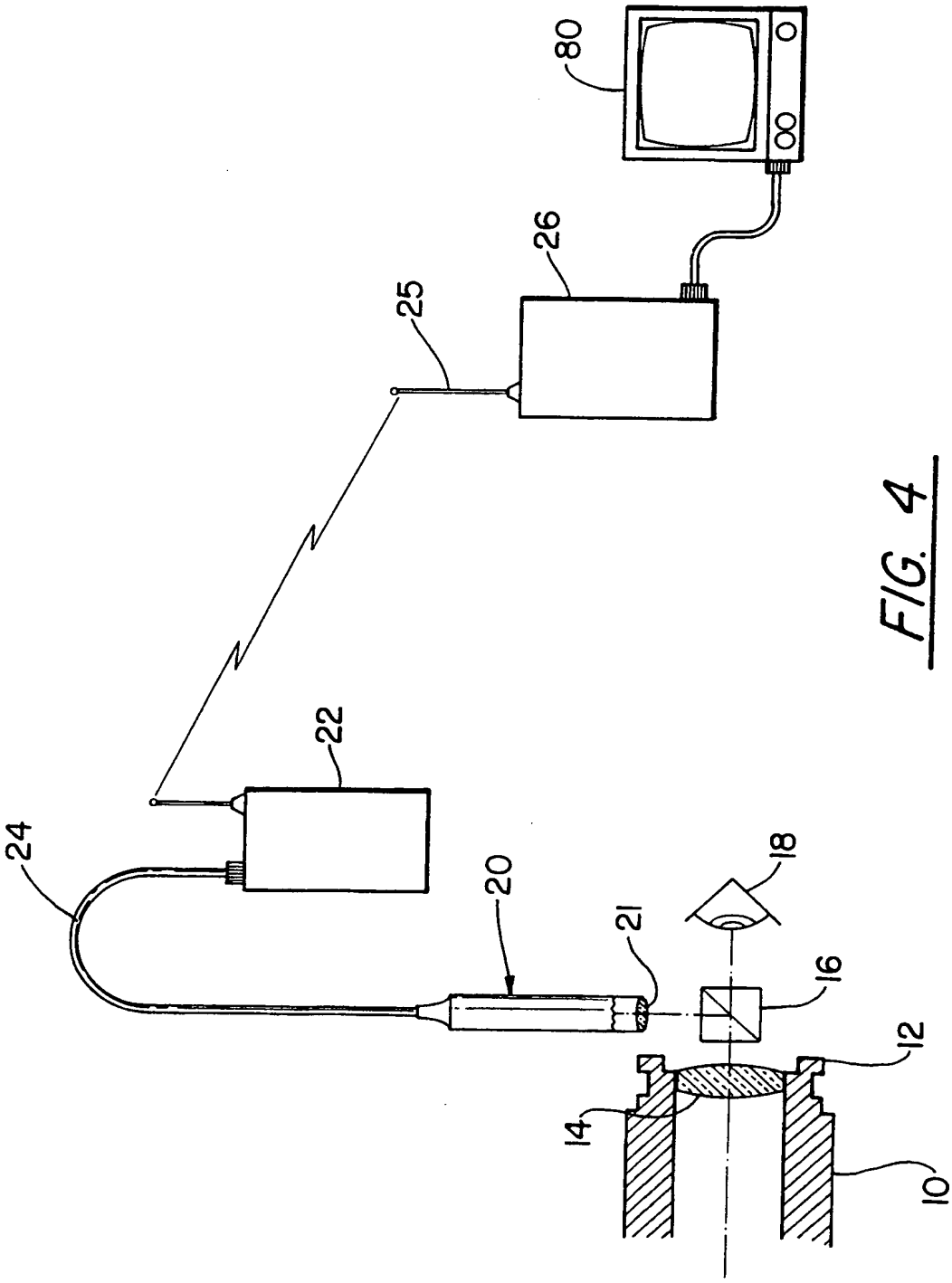


FIG. 4

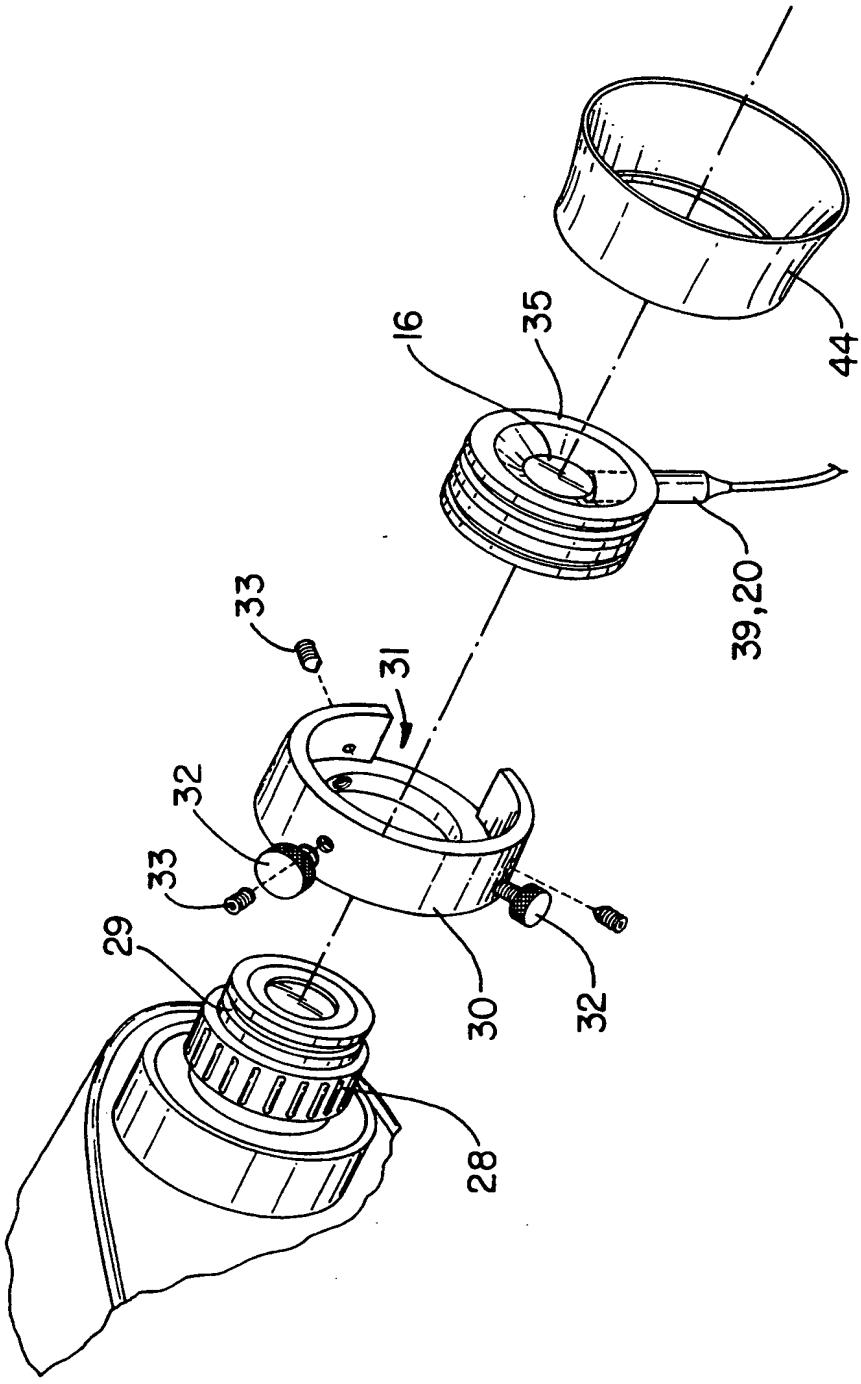


FIG. 5

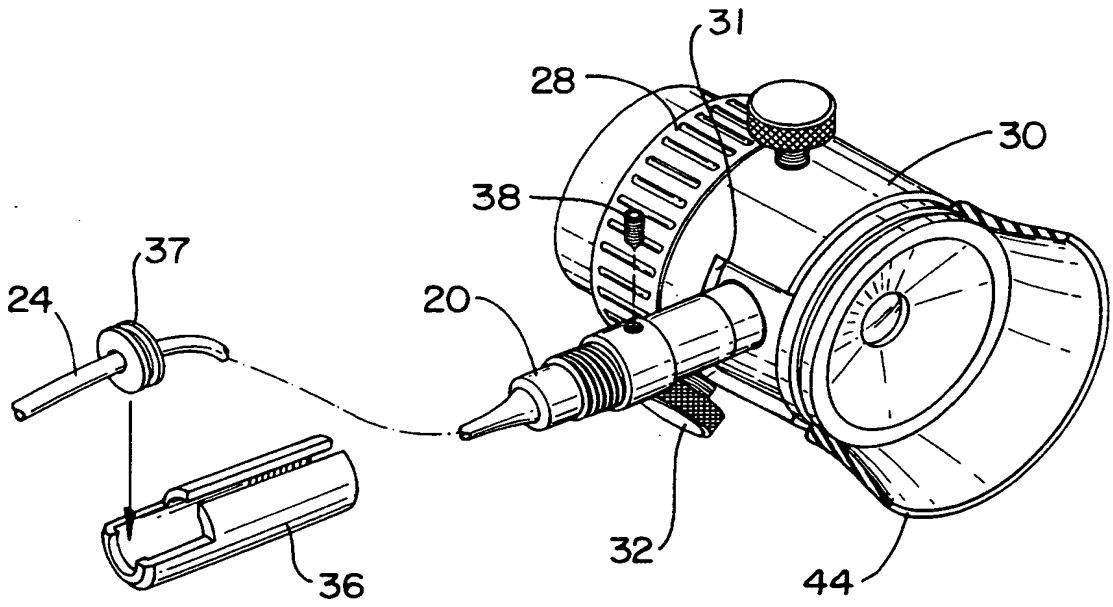


FIG. 6

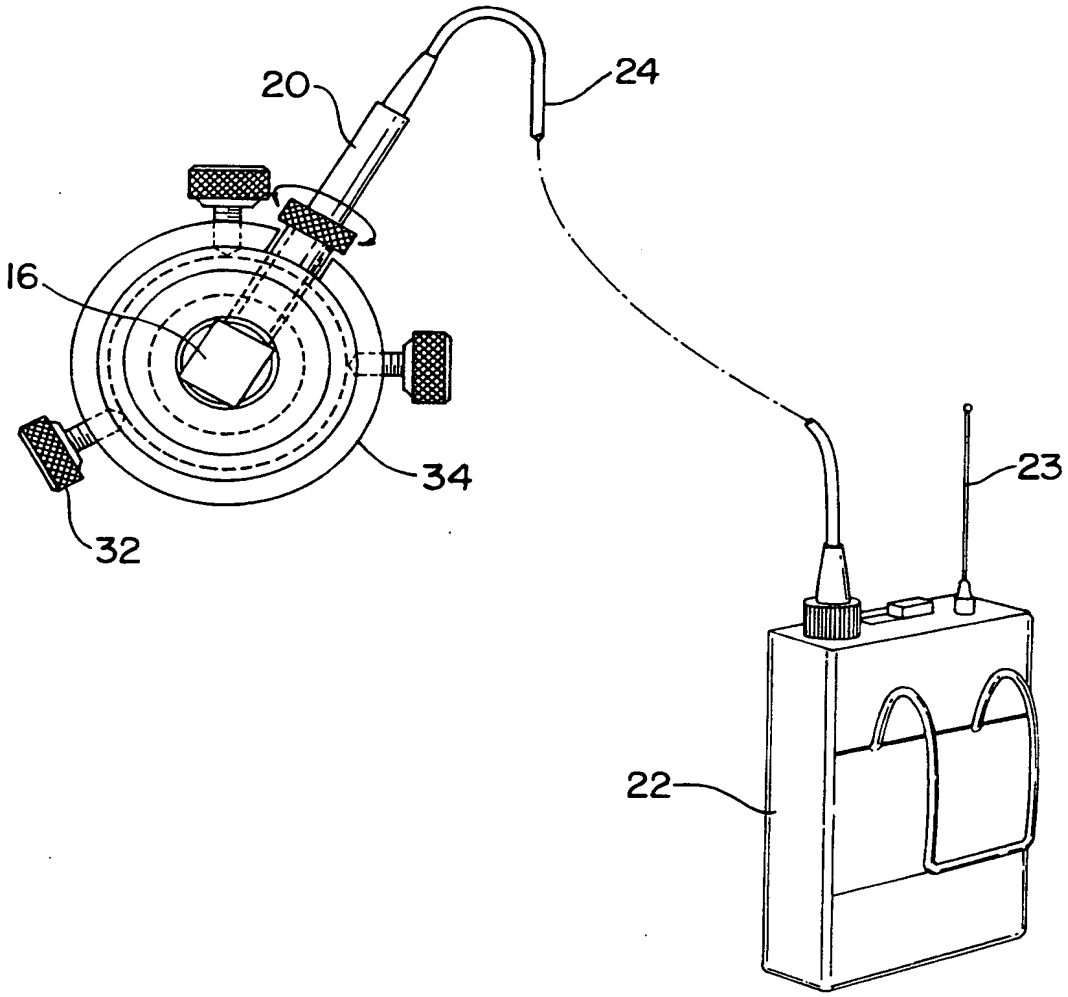


FIG. 7

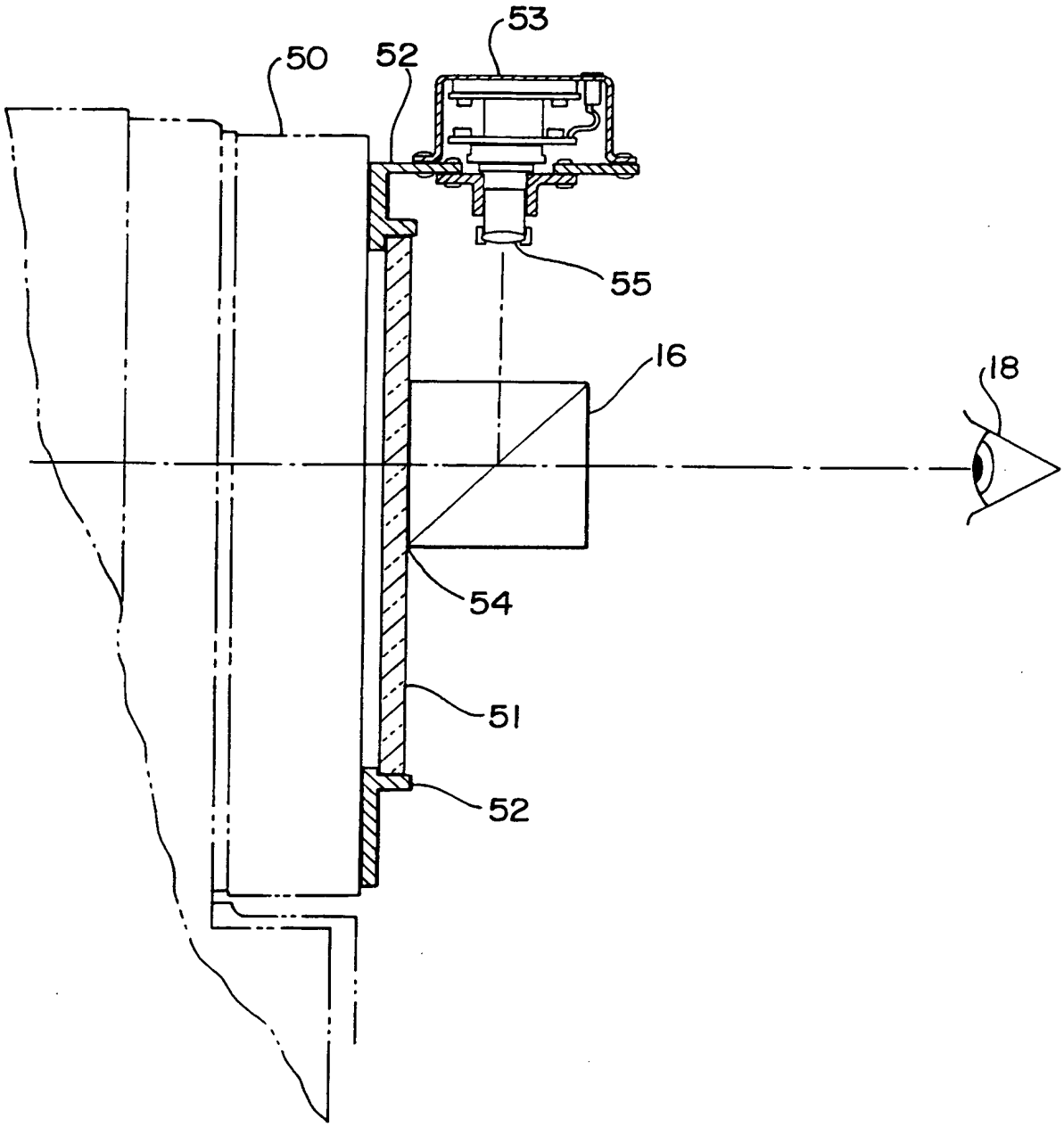


FIG. 8

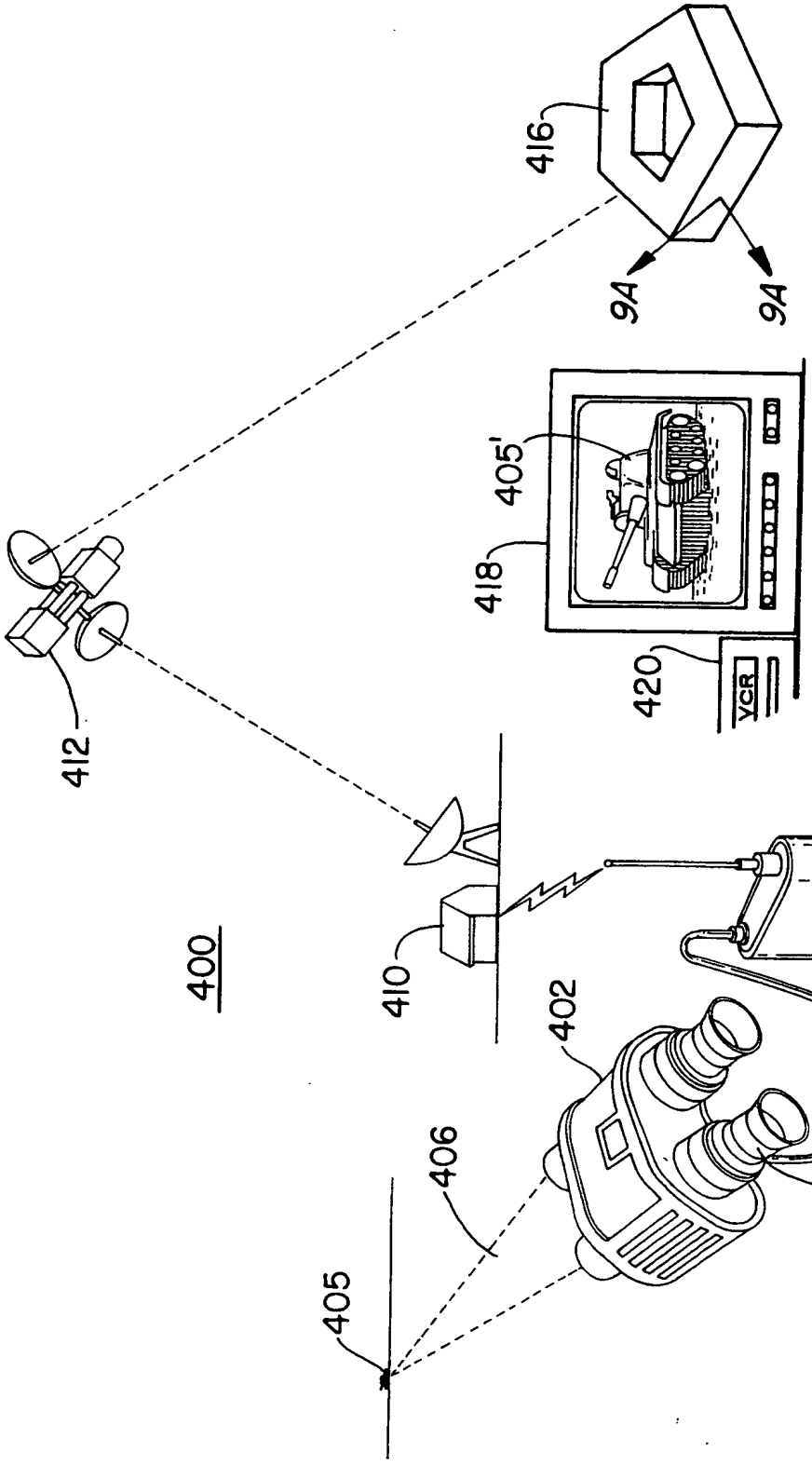


FIG. 9A

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03925

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/225
US CL :348/61, 335.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

None

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,047,846 A (UCHIYAMA et al) 10 September 1991, col. 2, lines 41-68.	1-16
A	US 5,189,512 A (CAMERON et al) 23 February 1993, col. 9, lines 37-46	1-16
A,P	US 5,572,229 A (FISHER) 05 November 1996, col. 5, lines 47-68 and col. 6, lines 1-19.	1-16
A	US 5,481,257 A (BRUBAKER et al) 02 January 1996, col. 8, lines 57-68 and col. 9, lines 1-50.	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 03 JUNE 1997	Date of mailing of the international search report 09 JUL 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer TUAN HO Telephone No. (703) 305-4943

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03925

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

348/37, 38, 39, 51, 52, 53, 54, 61, 47, 48, 49, 79, 80, 82, 113, 114, 115, 116, 118, 157, 158, 159, 207, 335, 341, 343, 344, 373, 375.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application Number

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or Agent's file reference: 6178-3

Box No. I TITLE OF INVENTION

REAL TIME, MULTIPLE PATH VIDEO IMAGING SYSTEM

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

FRASER-VOLPE CORPORATION
1025 Thomas Drive
Warminster Industrial Park
Warminster, PA 18974
U.S.

[ ] This person is also inventor.

Telephone No.:

Facsimile No.:

Teleprinter No.:

State (i.e. country) of nationality:

State (i.e. country) of residence: U.S.

This person is applicant for the purposes of: [] all designated States [X] all designated States except the United States of America [] the United States of America only [] the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

VOLPE, Joseph B.
1926 Audubon Drive
Dresher, PA 19025
United States of America

This person is:

[] applicant only

[] applicant and inventor

[X] inventor only (if this check-box is marked, do not fill in below.

State (i.e. country) of nationality:

State (i.e. country) of residence:

This person is applicant for the purposes of: [] all designated States [] all designated States except the United States of America [X] the United States of America only [] the States indicated in the Supplemental Box

[] Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: [X] agent [] common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

STEELE, J. Rodman, Jr.
FRIED, Harvey D.
NELSON, Gregory A.
BAIN, Joseph W.
SACCO, Robert J.
WHITLOCK, Ted W.

QUARLES & BRADY
Esperante Building, 4th Floor
222 Lakeview Avenue
West Palm Beach, FL 33401
US

Telephone No. (561) 653-5000

Facsimile No. (561) 653-5333

Teleprinter No. Express Mail Label No. EE444328793US

[] Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Express Mail Label No.
EH316333485US

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

[x] AP ARIPO Patent: KE Kenya, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda and any other State which is a Contracting State of the Harare Protocol and of the PCT

[x] EA Eurasian Patent: AZ Azerbijan, BY Belarus, KZ Kazakstan, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

[x] EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT

[x] OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of the OAPI and of the PCT *(if other kind of protection or treatment desired, specify on dotted line)*.....

National Patent (if other kind of protection ot treatment desired, specify on dotted line):

[x] AL Albania .....
[x] AM Armenia .....
[x] AT Austria .....
[x] AU Australia .....
[x] AZ Azerbaijan .....
[x] BB Barbados
[x] BG Bulgaria .....
[x] BR Brazil
[x] BY Belarus
[x] CA Canada
[x] CH and LI Switzerland and Liechtenstein
[x] CN China .....
[x] CZ Czech Republic .....
[x] DE Germany .....
[x] DK Denmark .....
[x] EE Estonia .....
[x] ES Spain .....
[x] FI Finland .....
[x] GB United Kingdom
[x] GE Georgia .....
[x] HU Hungary .....
[x] IS Iceland .....
[x] JP Japan .....
[x] KE Kenya .....
[x] KG Kyrgyzstan .....
[x] KP Democratic People's Republic of Korea .....
.....
[x] KR Republic of Korea .....
[x] KZ Kazakhstan .....
[x] LK Sri Lanka
[x] LR Liberia
[x] LS Lesotho
[x] LT Lithuania
[x] LU Luxembourg
[x] LV Latvia

[x] MD Republic of Moldova
[x] MG Madagascar
[x] MK The former Yugoslav Republic of Madagascar
[x] MN Mongolia
[x] MWMalawi
[x] MX Mexico .....
[x] NO Norway
[x] NZ New Zealand .....
[x] PL Poland
[x] PT Portugal .....
[x] RO Romania
[x] RU Russian Federation .....
[x] SD Sudan
[x] SE Sweden
[x] SG Singapore
[x] SI Slovenia .....
[x] SK Solvakia .....
[x] TJ Tajikistan .....
[x] TM Turkmenistan .....
[x] TR Turkey .....
[x] TT Trinidad and Tobago .....
[x] UA Ukraine
[x] UG Uganda
[x] US United States of America .....
.....
[x] UZ Uzbekistan .....
[x] VN Viet Nam .....

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

[x] All states which have acceded to the PCT treaty.
[x] IL Israel. .....
[x] MK Macedonia .....
...
[] .....
[] .....

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____.

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM

Further priority claims are indicated in the Supplemental Box [ ]

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) United States of America	13/3/96	60/013,346	
item (2)			
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

[X] The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): 1

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen, (the two-letter code may be used):* ISA/US

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:
Country (or regional Office): Date (day/month/year) Number:

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

1. request	:	3	sheets
2. description	:	12	sheets
3. claims	:	2	sheets
4. abstract	:	1	sheets
5. drawings	:	9	sheets
Total	:	27	sheets

This international application is accompanied by the item(s) marked below:

1. [ ] separate signed power of attorney
2. [ ] copy of general power of attorney
3. [X] statement explaining lack of signature
4. [ ] priority document(s) identified in Box No. VI as item(s):
5. [ ] fee calculation sheet
6. [ ] separate indications concerning deposited microorganisms
7. [ ] nucleotide and/or amino acid sequence listing (diskette)
8. [ ] Other (specify):

Figure No. 2 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Harvey D. Fried

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings [ ] received [ ] not received
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrects under PCT Article 11(2):	
5. International Searching Authority specified by the applicant ISA/___	6. [ ] Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

PCT

For receiving Office use only

International application no.

Date stamp of the receiving Office

FEE CALCULATION SHEET

Annex to the Request

Applicant's or agent's file reference 6178-3

Applicant JOSEPH B. VOLPE

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE	230.00	T	
2. SEARCH FEE	440.00	S	

International search to be carried out by U.S.P.O.

(If two or more International Searching Authorities are competent in relation to the international search, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 27 sheets.

first 30 sheets	677.00	b_1	
6 (remaining sheets) X 13.00 (additional amount) =	-0-	b_2	
Add amounts entered at b_1 and b_2 and enter total at B	677.00	B	
Designation Fee 11 (number of designations) X 164.00 (amount of designation fee) =	1804.00	D	

(If that total exceeds the figure which corresponds to the amount of the designation fee multiplied by ten, enter the latter figure in box D.)

Add amounts entered at B and D and enter total at I	2481.00	I	
4. FEE FOR PRIORITY DOCUMENT	24.00	P	
5. TOTAL FEES PAYABLE Add amounts entered at T, S, I, P, and enter total in the TOTAL box	3175.00 TOTAL		

[ ] The designation fee is not paid at this time

MODE OF PAYMENT

[] authorization to charge deposit account (see below)	[] bank draft	[] coupons
[X] cheque	[] cash	[] other *(specify):*
[] postal money order	[] revenue stamps	

DEPOSIT ACCOUNT AUTHORIZATION *(this mode of payment may not be available at all receiving Offices)*

The RO/ US

[] is hereby authorized to charge the total fees indicated above to my deposit account.

[X] is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

[] is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

17-0055
Deposit Account Number

13/3/97
Date *(day/month/year)*

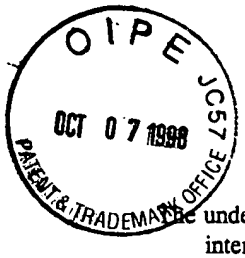
Harvey D. Fried

See Notes to the calculation sheet

Express Mail Label No.
EH316333485US

The demand must be filed direc[redacted]n the competent International Preliminary Examining A[redacted]ty or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/US



PCT
DEMAND

CHAPTER II

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty.

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND

Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION	Applicant's or agent's file reference
	6178-3

International application no.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US97/03925	13 March 1997 (13.03.97)	13 March 1996 (13.03.96)

Title of invention
REAL TIME, MULTIPLE PATH VIDEO IMAGING SYSTEM

Box No. II APPLICANT(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.*

FRASER-VOLPE CORPORATION
1025 Thomas Drive
Warminster Industrial Park
Warminster, PA 18974
US

Telephone No.:
(215) 443-5240

Facsimile No.:
(215) 443-0966

Teleprinter No.:

State (i.e. country) of nationality: US	State (i.e. country) of residence: US

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

VOLPE, Joseph W.
1926 Audubon Drive
Dresher, PA 19025
US

State (i.e. country) of nationality: US	State (i.e. country) of residence: US

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

State (i.e. country) of nationality:	State (i.e. country) of residence:

[ ] Further applicants are indicated on another continuation sheet.

VIA EXPRESS MAIL LABEL NO. EI316333185US

Express Mail
Label No. EH444328793YS

International application No.
PCT/US97/03925

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is [X] agent [] common representative

and [X] has been appointed earlier and represents the applicant(s) also for international preliminary examinations.

[] is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

[] is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.*

BAIN, Joseph W.
NELSON, Gregory A.
SACCO, Robert J.
STEELE, J. Rodman, Jr.
FRIED, Harvey D.
WHITLOCK, Ted W.

QUARLES & BRADY
222 Lakeview Avenue, 4th Floor
P.O. Box 3188
West Palm Beach, FL 33402-3188
US

Telephone No.:
(561) 653-5000

Facsimile No.:
(561) 653-5333

Teleprinter No.:

[] Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV STATEMENT CONCERNING AMENDMENTS

The applicant wishes the International Preliminary Examining Authority*

(i) [X] to start the international preliminary examination on the basis of the international application as originally filed.

(ii) [] to take into account the amendments under Article 34 of

[] the description (amendments attached).

[] the claims (amendments attached).

[] the drawings (amendments attached.)

(iii) [] to take into account any amendments of the claims under Article 19 filed with the International Bureau (a copy is attached).

(iv) [] to disregard any amendments of the claims under Article 19 and to consider them as reversed.

(v) [] to postpone the start of the international preliminary examination until the expiration of 20 months from the priority date unless that Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Box No. V ELECTION OF STATES

[X] The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)* except _____

(If the applicant does not wish to elect certain eligible States, the name(s) or country code(s) of those States must be indicated above.)

International application No.
PCT/US97/01432

Box No. VI CHECK LIST

The demand is accompanied by the following documents for the purposes of international preliminary examination:			For International Preliminary Examining Authority use only	
			received	not received
1. amendments under Article 34				
description	:	sheets	☐	☐
claims	:	sheets	☐	☐
drawings	:	sheets	☐	☐
2. letter accompanying amendments under Article 34	:	sheets	☐	☐
3. copy of amendments under Article 19	:	sheets	☐	☐
4. copy of statement under Article 19	:	sheets	☐	☐
5. other (specify):	:	sheets	☐	☐

The demand is also accompanied by the item(s) marked below:

1. [] separate signed power of attorney
2. [] copy of general power of attorney
3. [] statement explaining lack of signature
4. [x] fee calculation sheet
5. [] other (specify):

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing an the capacity in which the person signs (if such capacity is not obvious from reading the demand).

Harvey D. Fried
Attorney and Agent
Registration No. 28,298

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:
2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):
3. ☐ The date from the receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.
4. ☐ The date of receipt of the demand is WITHIN the period 19 months from the priority date as extended by virtue of Rule 80.5.
5. ☐ Although the date from the receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

See Notes to the request form

PCT
DEMAND

CHAPTER II

FEE CALCULATION SHEET

Annex to the Demand for International Preliminary Examination

International application No. PCT/US97/03925	For International Preliminary Examining Authority use only
Applicant's or agent's file reference 6178-3	Date stamp of the IPEA

Applicant

FRASER-VOLPE CORPORATION

Calculation of prescribed fees

1. Preliminary examination fee	490.00	P	
2. Handling fee	162.00	H	
Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box	652.00 TOTAL		

MODE OF PAYMENT

[]	authorization to charge deposit account (see blow)	[]	cash
[X]	cheque	[]	revenue stamps
[]	postal money order	[]	coupons
[]	bank draft	[]	other *(specify)*:

DEPOSIT ACCOUNT AUTHORIZATION *(this mode of payment may not be available at all IPEA's)*

The IPEA/US

[] is hereby authorized to charge the total fees indicated above to my deposit account.

[X] *(this check-box may be marked only if the conditions for deposit accounts of the IPEA so permit)* is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account

17-0055	06 October 1997	Harvey D. Fried
Deposit Account Number	Date *(day/month/year)*	Registration No. 28,298

Form PCT/RO/401 (Annex)(January 1994)

PATENT COOPERATION TREATY

RECEIVED
SEP 23 1998

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: J. RODMAN STEELE, JR.
QUARLES & BRADY
P. O. Box 3188, 4TH FL.
222 LAKEVIEW AVE.
WEST PALM BEACH, FL 33402-3188

PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing *(day/month/year)*	21 SEP 1998
Applicant's or agent's file reference: 6178-3	IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority Date *(day/month/year)*
PCT/US97/03925	13 MARCH 1997	13 MARCH 1996

Applicant: FRASER-VOLPE CORPORATION

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Wendy Garber
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4943

Form PCT/IPEA/416 (July 1992)★

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 6178-3	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US97/03925	International filing date *(day/month/year)* 13 MARCH 1997	Priority date *(day/month/year)* 13 MARCH 1996
International Patent Classification (IPC) or national classification and IPC IPC(6): H04N 5/225 and US Cl.: 348/61, 335.		
Applicant FRASER-VOLPE CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of ~ sheets.

3. This report contains indications relating to the following items:

   I ☒ Basis of the report

   II ☐ Priority

   III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability

   IV ☐ Lack of unity of invention

   V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   VI ☐ Certain documents cited

   VII ☐ Certain defects in the international application

   VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
06 OCTOBER 1997	01 JUNE 1998
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Wendy Garber Telephone No. (703) 305-4943

Form PCT/IPEA/409 (cover sheet) (January 1994)★

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

national application No.
PCT/US97/03925

I. Basis of the report

1. This report has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments)*:

[X] the international application as originally filed.

[X] the description, pages 1-12 , as originally filed.
pages NONE , filed with the demand.
pages NONE , filed with the letter of _____.
pages _____ , filed with the letter of _____.

[X] the claims, Nos. 1-16 , as originally filed.
Nos. NONE , as amended under Article 19.
Nos. NONE , filed with the demand.
Nos. NONE , filed with the letter of _____.
Nos. _____ , filed with the letter of _____.

[X] the drawings, sheets/~~fig~~ 1-9 , as originally filed.
sheets/~~fig~~ NONE , filed with the demand.
sheets/~~fig~~ NONE , filed with the letter of _____.
sheets/~~fig~~ _____ , filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

[X] the description, pages None.

[X] the claims, Nos. None.

[X] the drawings, sheets/~~fig~~ None.

3. [ ] This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:

NONE

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US97/03925

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	1-16	YES
	Claims	NONE	NO
Inventive Step (IS)	Claims	NONE	YES
	Claims	1-16	NO
Industrial Applicability (IA)	Claims	1-16	YES
	Claims	NONE	NO

2. CITATIONS AND EXPLANATIONS

Applicant's arguments filed MAR 27 1998 have been fully considered but they are not persuasive.

With regard to the Brubaker reference, Applicant argues that the reference is not considered to be of particular relevance. In response to the arguments, Examiner notes that the Brubaker et al is cited as a document defining the general state of the art; however, after carefully reviewing the reference, the Brubaker reference is used in the rejection which was set forth in section V, item (2)in the last PCT written opinion (408).

With regard to "Official Notice", Applicant argues that the "Official Notice" is not acceptable substitute for a citable reference. In response to the argument, Examiner notes that "Official Notice" is used to substitute for a prior art in case of a claimed limitation which is so common and well known that there is no need to show any prior art. However, in order to show claimed plurality of optical devices to be a common and well known subject matter in the art, a US Patent 5,335,014 is cited.

Claims 1-16 lack an inventive step under PCT Article 33(3) as being obvious over Uchiyama et al in view of Brubaker et al.

With regard to claim 1, Uchiyama et al discloses in Fig. 1, an image processing equipment with light source for a video camera, which comprises the same optical viewing path (objective lens 2, col. 2, line 46), beam splitter (objective lens 2 including mirrors can be removable from the system, col. 2, lines 45+), electronic video imaging device (high sensitive television camera 5), and video processor (timing generator 13 and CPU 6, col. 2, line 51), except for the plurality of independence optical viewing devices and transmitter.
Uchiyama et al does not explicitly disclose a plurality of optical view devices; however, a plurality of optical devices in a imaging system are old and well known in the art (Continued on Supplemental Sheet.)

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):
(Official Notice is taken for a plurality of optical devices). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a plurality of the image processing equipments of Uchiyama et al so as to accommodate to more than one user.
Furthermore, Brubaker et al teaches the use of a camera module which can transmit a radio signal to a station for displaying a monitor (col. 7); thereby to control or monitor the surrounding of the camera device. Therefore, it would have been obviously to one of ordinary skill in the art at the time the invention was made to incorporate the camera module of Brubaker et al in the image processing equipment of Uchiyama et al so as to obtain a camera system which is able to transmit signal to a control station and display; thereby to obtain a remote control and viewing the surrounding of the camera devices. With regard to the transmitted video signals being distinguishable from one another, since there are a plurality of video cameras which are used at the same time; therefore, frequencies are used for transmitting the video signal which must be inherently different, otherwise the control station cannot distinguish which video signal belonging to which device.

With regard to claim 2, Uchiyama et al discloses in Fig. 1, the same eyepiece (eyepiece 1, col. 2, line 51).

With regard to claim 3, Uchiyama et al discloses in Fig. 1, the same integral unit (objective 2 and television camera 5).

With regard to claims 4, 5, and 6, claims 4, 5 and 6 recite what previously discussed in claim 1.

With regard to claims 7, 8, 9, 10 and 16, claimed global positioning sensor, monocular, binocular, periscope and satellite link are old and well known in the art (Official Notice is taken for the devices). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the devices in the system of the uchiyama et al in view of Brubaker et al so as to obtain the particular device which are adapted to individual needs.
With regard to claim 11, Uchiyama et al discloses in Fig. 1, the same multiple mirrors (mirrors are disposed in the objective lens 2).

With regard to claims 12, 13, 14 and 15, claims 12, 13, 14 and 15 recite what was previously discussed in claim 1.

Claims 1-16 have industrial applicability under PCT Article 33(4) because the subject matter claimed can be made or used in industry.

———— NEW CITATIONS ————
NONE

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):
(Official Notice is taken for a plurality of optical devices). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a plurality of the image processing equipments of Uchiyama et al so as to accommodate to more than one user.
Furthermore, Brubaker et al teaches the use of a camera module which can transmit a radio signal to a station for displaying a monitor (col. 7); thereby to control or monitor the surrounding of the camera device. Therefore, it would have been obviously to one of ordinary skill in the art at the time the invention was made to incorporate the camera module of Brubaker et al in the image processing equipment of Uchiyama et al so as to obtain a camera system which is able to transmit signal to a control station and display; thereby to obtain a remote control and viewing the surrounding of the camera devices. With regard to the transmitted video signals being distinguishable from one another, since there are a plurality of video cameras which are used at the same time; therefore, frequencies are used for transmitting the video signal which must be inherently different, otherwise the control station cannot distinguish which video signal belonging to which device.

With regard to claim 2, Uchiyama et al discloses in Fig. 1, the same eyepiece (eyepiece 1, col. 2, line 51).

With regard to claim 3, Uchiyama et al discloses in Fig. 1, the same integral unit (objective 2 and television camera 5).

With regard to claims 4, 5, and 6, claims 4, 5 and 6 recite what previously discussed in claim 1.

With regard to claims 7, 8, 9, 10 and 16, claimed global positioning sensor, monocular, binocular, periscope and satellite link are old and well known in the art (Official Notice is taken for the devices). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the devices in the system of the uchiyama et al in view of Brubaker et al so as to obtain the particular device which are adapted to individual needs.
With regard to claim 11, Uchiyama et al discloses in Fig. 1, the same multiple mirrors (mirrors are disposed in the objective lens 2).

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Claims 1-16 have industrial applicability under PCT Article 33(4) because the subject matter claimed can be made or used in industry.

———— NEW CITATIONS ————

NONE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03925

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/225
US CL :348/61, 335.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

None

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,047,846 A (UCHIYAMA et al) 10 September 1991, col. 2, lines 41-68.	1-16
A	US 5,189,512 A (CAMERON et al) 23 February 1993, col. 9, lines 37-46	1-16
A,P	US 5,572,229 A (FISHER) 05 November 1996, col. 5, lines 47-68 and col. 6, lines 1-19.	1-16
A	US 5,481,257 A (BRUBAKER et al) 02 January 1996, col. 8, lines 57-68 and col. 9, lines 1-50.	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
03 JUNE 1997

Date of mailing of the international search report
09 JUL 1997

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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03925

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

348/37, 38, 39, 51, 52, 53, 54, 61, 47, 48, 49, 79, 80, 82, 113, 114, 115, 116, 118, 157, 158, 159, 207, 335, 341, 343, 344, 373, 375.